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ABSTRACT

The experiences of black and Hispanic students from low income families who spent their senior year in this program is reported and evaluated. The Secondary Education Through Health (SETH) program was designed to prepare interested inner city high school seniors to enter medical and health careers and to give them an understanding of environmental health issues affecting the East Harlem community. The program provided three types of learning settings: lecture or recitation classes in academic subjects, environmental health projects in which students functioned as field researchers, and job placements in various working units throughout the hospital. The overall objective of the program was to contribute to a conceptual scheme and a methodology for documenting and evaluating qualitatively and quantitatively both formal and nonformal aspects of alternative educational programs. (Author/MC)

SECONDARY EDUCATION THROUGH HEALTH

ENVIRONMENTAL HEALTH PROGRAM

1976 - 1977

MOUNT SINAI SCHOOL OF MEDICINE

FINAL REPORT - OFFICE OF ENVIRONMENTAL EDUCATION

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Student's Access Language And Performance With People, Data, And Things In The Formal And Non-Formal Settings Of An Alternative High School

~~April~~ MARCH 28, 1978.

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ABSTRACT

Students' Access Language and Performance with People, Data, and Things in the Formal and Non-Formal Settings of an Alternative Inner-City High School.

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This paper reports on a qualitative/quantitative research paradigm designed for application to work-study and/or other alternative educational programs which represent combinations of formal and non-formal education. The research employs social ecology; task analysis, and sociolinguistics to explore linkages between instructional and work settings and to explore which setting characteristics evoke the highest levels of student functioning with things, with data and with people and the most use of "access language". Findings support the utility of the observation instrument and the efficacy of a curriculum model that represents an intersection of formal and non-formal strategies.

Introduction

The proposed paper reports on evaluation research conducted for the work study program of an alternative school located at Mount Sinai Hospital in New York City. The program, known as SETH (Secondary Education Through Health), was designed to develop in inner city high school seniors entry level academic

and work skills for medical and health careers as well as an understanding of environmental health issues affecting the students' own East Harlem community. The program provided three types of learning settings--lecture--recitation classes in academic subjects, environmental health projects in which students functioned as field researchers, and job placements in various working units throughout the hospital.

Objectives

The overall objective of the research was to contribute to a conceptual scheme and to methodology for documenting the quality of both formal and non-formal aspects of alternative educational programs. More specific objectives were:

1. The development of an observation instrument that could apply equally to instructional and work (formal and non-formal educational) settings, an instrument that could enable the observer to make comparisons and establish linkages between these different settings and the student behaviors found in them.

2. To ascertain levels of student performance with things, data, and people in the different settings, i.e., levels of physical, intellectual, and social functioning.

3. To measure the use of 'access language'--talk used to gain or maintain control of a situation--in the different settings.

4. To understand better the communicative patterns (codes and registers) required of participants in various job settings and ways in which these patterns vary from those required in school settings.

5. To identify conditions that are associated with higher level performances across settings--the assumption being that student enactment of higher levels of physical, intellectual and social functioning and their more extensive use of access language maximizes the learning that is taking place.

Perspectives

The research reflects social ecology's general concern with the relationships between physical, cognitive and social aspects of behavior milieus (Lewin, Barker, Soskin and John, Moos); the present investigators' particular concern with who or what controls these different aspects of the environment (Goffman, Bernstein, Grannis); occupational psychology's concern with the levels of people, data, and things functioning that are characteristic of different jobs (Fine); sociolinguistics' concern with the effects of different settings on language use (Gumperz, Hymes); and an interest in relating all these concerns to the environments of the students' educational and vocational development.

The point of view reflected here is that students in late adolescence have already developed basic communicative competencies and skills of functioning with people, data, and things in various contexts familiar to them and that what is now at stake in their education is the articulation of these competencies with the specifics of new contexts, in the present case their adaptation to the particulars of health career

oriented activities. Methodologically, this gives priority to comparing settings to establish which evoke the highest level student performances, rather than concentrating on the gains emphasized in the pre-test/post-test model of learning.

Data Sources

A purposive sample of 14 students, stratified with respect to gender, ethnicity (Black/Hispanic), entry Metropolitan Reading Test score (above 8.0/below 8.0), and Nowicki-strickland locus of control score (externals above 14/internals below 11), was drawn from the student population of 90.

Data Collection

Each student was observed for a total of about 7 observer hours in his or her classes and project and/or placement. Each observation required two observers. One observer used a Setting Behavior Inventory (SBI) while the other simultaneously employed a Verbal Behavior Inventory (VBI) Both of these instruments were developed for this assessment pursuant to objective #1 described above.

The SBI recorded over successive five minute intervals an inventory of the people (school or hospital staff, student peers, and patients or other individuals), data sources, and things related to a subject's activity; staff's, peers', and subject's highest levels of functioning with people, data, and things; the format for interaction between the subject and other people in the setting; and the subject's levels of activation, initiation, and involvement. These categories reflect an amalgamation of categories from Grannis' previous

research on classroom environments and the system of analyzing levels of people, data, and things functioning developed by Fine for the Dictionary of Occupational Titles to analyze virtually all jobs in the economy. The advantage of using the D.O.T. scheme is the possibility of making direct comparisons between the functioning of students and the functioning required in or characteristic of different occupations. This is the first research in secondary school education to use the D.O.T. system to examine students' and staff's levels of functioning in both school and work related contexts.

While verbal as well as nonverbal behavior figured in the SBI observation, the VBI examined the verbal behavior in much greater detail, recording the goals, task relatedness, symmetry and participant structure of the verbal interaction as a whole as well as the frequency and direction of 'solicits' (utterances exhibiting control strategies) over five minute intervals concurrent with the SBI observation.

The subject wore a wireless microphone and a tape recording was thus made of the verbal interaction in the subject's vicinity. Finally, subjects were debriefed following selected observations and all subjects were interviewed about their experiences in the program at the conclusion of the school year.

Interobserver reliability of .70 or higher was obtained for all the variables employed in this research report.

Data Analysis

Mean percentages of time various conditions prevailed

co-operatively in concrete tasks. These optimal staff roles were open to subjects' soliciting, and were adapted to subjects' competencies and knowledge. This was reflected in an overlap between the complexity or power of staff's and subjects' people and data funtioning, and in the medium intensity of staff activity and the joint initiation that characterized the highest levels of subjects' people, data and things functioning, and subjects' soliciting. Qualities of the verbal interaction or verbal context that accompanied these higher level performances included partially (as opposed to highly) task related talk, high rates of peer participation, and, in settings with greater numbers of peers, participant sturctures that allowed for multi-stranded conversations. Low readers solicited much more than high readers, but did so in the more formal or mixed formal and non-formal settings and in general appeared to adapt less well to the communicative requirements of the non-formal settings.

These optimal conditions for subjects' performances seemed to represent an intersection of formal and non-formal educational conditions within settings. More generally, the program appeared to synthesize its more formal and non-formal aspects in such a way as to enhance students' performances and learning overall. An issue which the hospital placements usually, but not always, successfully resolved was the potential conflict between accountability to the students' education and accountability to the unit's standards. This is likely to be an issue in other work settings of education. The findings warrant further investigation of the complementarity of

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different settings in eliciting high level student performances, and suggest the possibility of monitoring a wide variety of settings to give feedback to program participants and sponsors.

THE ENVIRONMENTAL HEALTH PROGRAM: DESCRIPTION AND OBJECTIVES

During the 1976-77 school year, 90 students from two New York City high schools spent their senior year in the Secondary Education Through Health (SETH) Program at the Mount Sinai Hospital. All of the students were members of Black or Hispanic low-income families. Their average reading level at the beginning of the year was 8.0. All of the students had evinced some interest in a medical or environmental health career prior to their coming to SETH.

This report focuses on the quality of the students' experience in SETH. In so doing, it addresses itself to the larger question of how one documents and evaluates the experiential aspect of an environmental health curriculum, and of environmental education programs more generally.

"Experiential education" engages learners directly with the referents of their learning-objects, people, activities, and problems not just invented for teaching. In an environmental health program, this most obviously includes collecting primary data on pollutants in the community, participating with professionals in laboratory and patient care settings, and communicating with the producers, the consumers, and policy makers involved in the economics and politics of pollution.

STUDENT PROGRAM:

All of the students pursued a science course comprised of six environmental health units designed by SETH staff. They also took regular New York City Board of Education English,

mathematics, and social studies courses taught on the hospital premises. These four courses occupied the students eight half days a week throughout the year. In addition, the students spent two mornings a week in an environmental placement or project.

The placements involved working as aides, assistants, and clerks in a variety of patient care and research settings: Prenatal Care, EKG, Dental Care; Microbiology Lab, Emergency Room Lab, Blood Bank, and other sections of the Mount Sinai complex, and an Environmental Protection Agency office outside Mount Sinai. The projects included publication of a bulletin reporting on local health hazards, and the production of a series of videotapes on the effects of such pollutants as noise, asbestos, and lead on the health of individuals and groups in the East Harlem community. Some students were engaged in a single placement or project for both semesters, while others switched from one assignment to the other at midyear. The science course, the placements, and the projects were all construed as components of the Environmental Health core of the SETH program.

ASSUMPTIONS:

Like experience, involvement implies "doing" rather than just passively observing. Listening and watching may indeed entail covert thinking and feeling, and can on occasion be highly involving in this sense. However, experiential educators from Dewey to Piaget have argued that some sort of interplay between external and internal actions is necessary for the full development of thought and feeling. The gap between abstract ideas and their concrete referents, the fact that abstractions have been

lifted out of contexts in which typically many factors are at work, and a learner's need to test competencies, ask questions, express reactions, and obtain feedback in "real time" sequences, all are aspects of the argument for experiential education. The alienation of many students from purely formal education, especially students like those who came to SETH, is alleged to stem from the failure to provide opportunities for them to operate in, and on, the contexts their learning refers to.

SETH'S LEARNING OBJECTIVES:

Three general categories of objectives for students in the Environmental Health core of SETH were referred to at various points in the proposal for 1976-77. These can be summarized as (1) developing in the students an ability to apply ecological concepts to environmental health problems, (2) involving them in situations where health problems are being recognized and met, and (3) developing in them entry level skills for medical and environmental health careers. Products of the students' activity--news bulletins, videotapes, charts, essays, tests, and content oriented interviews of the students--furnish the major evidence bearing on the first of these objects. This evidence is discussed in a parallel report (Appendix D). Observations of the students "in situ", post observation debriefings, and a questionnaire to tap students' perceptions of their science classes, placements, and projects as work-study environments, furnish the principal evidence of the quality of the students' involvement in environmental health situations, and their development of health career related skills. This is the evidence presented and analyzed in this present section of the evaluation report.

SETH was not a paraprofessional training program, nor would that necessarily have been the most valid way to interpret its aim to develop entry level skills for medical and health environment careers. On the formal side of their learning, the students' improvement of reading and writing, mathematical, scientific, and civic literacy was aimed at their gaining entry to post-secondary school educational programs for health related careers. On the non-formal side, students would be considered to be "entering" if they could be observed actually functioning at higher levels than simply taking instructions, copying information, or handling materials in health research and treatment contexts. In other words, if students were using an environmental research team's categories to classify data, or were manipulating--physically coordinating various elements of--laboratory equipment to conduct a test on some material, or were adapting to staff in a division of labor for a concrete task, these activities would evidence their participating in the intellectual, physical, and social work of the environmental health settings, and thus their manifesting entering skills.

EVALUATION FRAMEWORK:

The SETH program evaluation describes the various program settings and the students' performances in them.

In recent years, as alternative educational programs have proliferated--including a large number of environmental education programs-- it has become increasingly clear that an assessment of student performances must be able to specify the conditions under which the pertinent behaviors were observed (Charters and Jones, 1973).

It is a question of coming to understand what settings evoke students' competencies, and finding out as precisely as possible the characteristics of these settings that might be associated with student performances. One wants to know not only about the students' functioning, but what the students have been exposed to in settings where they themselves are not externally active, yet where their attention manifests a high degree of internal involvement.

In short, the environment of the students' behavior must be studied. Congruent with its aims for the students themselves, SETH chose an environmental approach to the assessment of the quality of the students' experience in the program.

Adolescent students have already developed skills of interpersonal relating, data classification, and so on, in various contexts familiar to them, so that what is at stake is the further development of these competencies in new contexts, in the present case their adaptation to the specifics of health related careers. What evaluation must examine in experiential education is not learning thought to take place simply between the beginning of a program when it is not manifested and a later point in time when it is, i.e., the gains of the conventional pre-test/post-test model of learning.

Experiential education postulates that certain settings more effectively evoke capacities that the students have already developed: capacities to deal with people, data, and things, that are not suspected because the students do not display them in more stereotypical classrooms. Ideally, an interplay can be envisioned between the non-formal and the formal aspects of a

program such as SETH's. The non-formal engagement of the students' competencies creates experience (experience is not independent of action) which formal instruction then makes more generalizable, especially through the labeling of the experience. The formal learning, in turn, renders more information available in the non-formal settings, thus generating still more experience. Central to all this is the control that the students gain over the conditions of their learning and experience. SETH sees the overlap between the formal and non-formal, or academic and experiential, as crucial to enhancing the students' control. This overlap is spoken to again in the section that follows.

SETTINGS IN SETH:

The SETH program included settings that were formal, non-formal, and mixed formal and non-formal, i.e., different combinations of didactic and experiential. These settings are schematized in the following way:

GENERAL EDUCATION	ENVIRONMENTAL HEALTH EDUCATION		
English Mathematics Social Studies	Science Course	Projects	Placements
FORMAL SETTINGS	NON-FORMAL SETTINGS		

English, mathematics, social studies, and science were all pursued in classroom settings where there was a "teacher", an individual whose principal role was teaching, and where the verbal expository proportion of the activity was presumed to be relatively high.

Placements entailed the students' participating in out-of-classroom settings where there was typically no one whose principal role was teaching, and where the verbal expository proportion of the activity was presumed to be relatively low. ("Presumed" refers here to the usual assumptions about formal and non-formal settings; see Scribner and Cole, 1973.* These assumptions will be checked in the data analysis below.) Projects involved students in the observation and analysis of health environments outside the classroom, but were conducted at least half of the time in classrooms, and were led by SETH teaching staff. Thus they might be expected to have manifested a mix of formal and non-formal characteristics. In addition to more verbal formulation in the formal setting, these characteristics includes more "why" questions and explanations and less connection between language and action. The non-formal setting is characterized by more learning associated with using a tool or scheme to accomplish some immediate purpose, rather than learning something to accomplish a future purpose; more learning by observation and imitation and more learning through identification and cooperation with those who have skills in the non-formal setting. (Scribner and Cole, 1973.)

To make judgments about students' and staff's performances in the different program settings, SETH used an adaptation of the system for analyzing levels of data, things, and people functioning

* Scribner, Sylvia and Michael Cole. Cognitive consequences of formal and informal education. Science, 182, 1973, 553-559.

that is employed in the United States Employment Service's Dictionary of Occupational Titles*. (D.O.T. is used to analyze virtually all jobs in the economy.)

The idea of "levels" here is a hierarchical one. Skills at one level of functioning are considered to be more comprehensive or complex than those at a lower level, and thus generally subsume those at lower levels, as, for example, the intellectual skills of analysis subsume those of sheer information retrieval and comparison.

The potential advantages of using the D.O.T. scheme are immediately evident. Instead of relying soley on more general or anecdotal testimony that students were involved and useful in the work settings, one can ask precisely what levels of staff functioning students are observing and coordinating with, and what levels they themselves are functioning on.

This use of the D.O.T. scheme links environmental education with career education by analyzing the environments and activities of the students' education in career oriented terms. SETH is the first project in secondary school education to use the D.O.T. system to examine students' and staff's levels of functioning in both school and work related contexts.

* Washington: U. S. Department of Labor
U. S. Employment Service
Dictionary of Occupational Titles. (2 vols., 3rd ed.; 1965.)
See also Fine and Wiley, 1971.

SETH supplemented the D.O.T. scheme with an analysis of verbal soliciting behavior of students and staff in the various program settings. Verbal soliciting behaviors are all those verbal behaviors that call for a response from an addressee, i.e. questions, requests, demands, suggestions, contradictions, and so forth -- in sum, verbal behaviors that call for a response from the addressee.

Students' questioning had been identified by SETH staff as a particularly important learning behavior that they wanted to foster. A member of the evaluation unit, Schwarz, who had been a teacher with SETH in a previous year, had oriented to verbal soliciting more generally as crucial for the students' gaining access to new information and situations. Schwarz views verbal soliciting as being greatly influenced by language context, i.e. the setting conditions for language behavior.

Higher rates of students' soliciting related to health environment topics or activities, together with higher levels of students' data, people, and things functioning in health environment contexts, were defined as the principal student behaviroal objectives of the SETH Environmental Health Program. Involvement, a measure of the intensity of a subject's attention or arousal to a task, was also included in the behavioral objectives for subjects.

PROCEDURES:

The evaluation unit developed a detailed observation scheme to explore a broad range of setting features along with students' levels of functioning and verbal soliciting. Both the number of subjects and the number of observation hours were

limited in order to make possible this breadth, and to allow time for the anlysis that the data lent itself to.

Early in the Fall semester, a purposive sample of 14 subjects was selected for observation and case study. Students' ethnicity, gender, Metropolitan Achievement Test reading score, and Nowicki-Strickland locus of control score, were used to set up categories. The Nowicki-Strickland instrument determines the extent to which an individual perceives that can influence the outcome of valued events in life, (like having friends and doing well in school) as opposed to those being determined by fate or forces beyond one's control (referred to as externality in this study). Perceived locus of control has been shown in other research to correlate with many other attributes of individuals, particularly educational and occupational aspiration and achievement. This variable was controlled for in the present research. Other variables controlled for were ethnicity, gender, and reading score, which speak for themselves as potentially important variables among students.

Fourteen subjects were randomly drawn from the categories formed with these variables. The subjects were distributed as follows:

TABLE 1

Distribution of Observation Subjects

	Black		Hispanic	
	Male	Female	Male	Female
High reading, high external	1	1	1	0
High reading, low external	1	1	1	1
Low reading, high external	1	1	1	1
Low reading, low external	1	1	0	1

There were no male Hispanic students who were low on both reading and externality, and no female Hispanic students high on both reading and externality, at the time of selecting the sample.

DESIGN:

Since each student was being observed in various settings, each student was his or her own control, for the purpose of comparions of student behavior in different settings. Comparisons between high and low reading, male and female students, etc., can also be made, though they have been constrained by not having students of every trait combination in Table 1.

Each of the 14 subjects was observed individually in both class and placement and/or project settings, during the Fall and the Spring semesters for an average total of about 7 observer hours per subject. In addition, a variety of informal observations were conducted in the different settings, and each subject was interviewed both formally and informally at various times.

THE OBSERVATION INSTRUMENT:

Two systems of observation were used - each system and observation required its own observer. One observer used a Setting and Behavior Inventory (SBI) while the other simultaneously employed a Verbal Behavior Instrument (VBI). These instruments, both of which were developed for this assessment, have been described in a previous report. (SETH Evaluation Unit First Progress Report, 1977.) In general, the SBI recorded at successive five minute intervals an inventory of the people

(school or hospital staff, student peers, and patients or other individuals), data sources, and things related to a subject's activity; staff's, peers', and subject's highest levels of functioning with people, data, and things; the format for interaction between the subject and other people in the setting; and the subject's level of activation, initiation, and involvement.

While verbal as well as nonverbal behavior figured in the SBI observation, the VBI examined the verbal behavior in much greater detail, recording the goals and task relatedness of this behavior, and the frequency and direction of solicits (verbal utterances seeking a response) and responses, over five minute intervals concurrent with the SBI observation. The two observers also made informal notes on the settings and behavior. The subject wore a wireless microphone, and a tape recording was thus made of the verbal interaction in the subject's vicinity. Finally, subjects were debriefed following selected observations, and all subjects were interviewed about their classes, projects and/or placements, at the conclusion of the school year.

An interobserver reliability of at least .70 was obtained for each of the observation variables in the form in which they are presented in this report. A number of the variables have been condensed from finer discriminations in order to obtain this reliability, and for greater economy of reporting.

The fact that the observers followed individual subjects for periods of time varying between 15 minutes and an hour and a half means that various specific observations were likely to

be repeated from one five minute interval to another. For example, if staff was leading a discussion during a given 5 minute interval, and subject was listening but not speaking or taking notes during this time, there was a certain likelihood that staff continued to lead a discussion during the ensuing 5 minutes, and, if not with the same probability, that subject continued simply to listen. This inter-dependence of the observations from one 5 minute interval to another within an observation session for a given subject violates the assumption of non-interdependence made by most statistical tests of significance. It is possible to locate these so-called Markov chains of sequentially interdependent observations, and to test the significance of transformations of the data. However, this procedure was judged to be too elaborate for the present study. It would have higher payoff for a subsequent study that first of all modified its categories and sampling procedures in accordance with the most obvious things learned from this present exploratory study. This will be discussed further in a concluding section. The findings of the present report will be presented as percentages and cross-tabular trends, with no attempt to ascertain their statistical significance.

FINDINGS

Comparison of the General Education and Health Environment Settings.

The strategy of this first analysis is to use the General Education classes -- English, mathematics, and social studies -- as relatively familiar baselines from which to judge the properties of the Health Environment settings and the performance of subjects observed in them.

The SETH English, mathematics, and social studies were carefully planned courses in which the degree of students' involvement generally appeared to be higher than one has come to expect in inner-city classrooms. In their end-of-year class ratings, the subjects rated these courses in mostly positive terms. The General Education courses, then, are not straw men for this comparison.

Table 2 summarizes the proportions of time the subjects were observed under various conditions in the General Education and Health Environment settings of SETH, and the proportions of time the subjects manifested various behaviors in these settings. The long table is easily read and can be approached as an abstract of these first findings. For each variable, for example School or Hospital Staff Presence, the percentages add up to 100% within each of the four categories of settings included, the General Education classes, the Environmental Science classes, Health Environment Projects, and Hospital or Agency Placements. Thus subjects were observed in General Education settings without peers 1% of the total time observed in the General Education classes, 12% of the time with

1 to 5 peers present, 17% with 6 to 10 peers present, and 70% with 11 or more peers present. This means that the subjects virtually never were observed in isolation from other students in the General Education classes, though they were found in small or medium size groups some of the time. With respect to the question of what interaction formats were employed in the General Education classes, the 100% of time that subjects were observed in these classes breaks down into 10% lecture or demonstration formats, 57% discussion, 32% supervised task, and 1% unsupervised task.

TABLE 2

Proportions of time subjects were observed under various conditions in each SETH Program component.

(24 intervals of observation in special settings are omitted from this table but included in subsequent cross tabulations.)	GEN.ED.	HEALTH ENVIRONMENT		
	Gen.Ed. Classes	Env.Sc. Classes	Project	Placement
Total number of 5 minute intervals observed.	145	72	105	210
SOCIAL ENVIRONMENT				
A. Level of staff activity in relation to subject over 5 minute intervals.				
0. Not present in subject's vicinity.	12%	6%	7%	27%
1. Present, but not active with S.	11%	7%	5%	6%
2. Active with S part of 5 minutes	30%	18%	34%	16%
3. Active with S most of 5 minutes	47%	69%	54%	51%
B. Peers present with subject				
0. No peers in setting	1%	0%	0%	74%
1. 1-5 present	12%	0%	55%	23%
2. 6-10 present	17%	35%	39%	3%
3. 11+ present	70%	65%	6%	0%
C. Interaction format				
1. Lecture/demonstration	10%	4%	1%	19%
2. Discussion	57%	76%	19%	4%
3. Task supervised by or co-operative with staff	32%	20%	65%	43%
4. Task independent of staff	1%	0%	15%	34%
D. Staff people functions				
0. No staff relationship to subject manifest	3%	0%	10%	34%
1. Instructing, conducting recitation	56%	54%	46%	16%
2. Supervising, moderating discussion	34%	46%	14%	25%
3. Consulting or lower power function	7%	0%	30%	25%

	GEN.ED	HEALTH ENVIRONMENT		
	Gen.Ed. Classes	Env.Sc. Classes	Project	Placement
E. Subject people functions				
0. No relationship to people manifest	2%	0%	10%	24%
1. Taking instructions, helping	34%	55%	18%	31%
2. Exchanging information	62%	32%	31%	18%
3. Serving or higher power function	2%	13%	41%	27%
F. Initiation, direction of ongoing activity				
1. Others initiate only	61%	54%	32%	30%
2. Subject and staff w/w.o. peers	26%	32%	50%	32%
3. Subject and peers only	8%	0%	18%	8%
4. Subject only	5%	14%	0%	30%
G. Subject activity level over 5 mins.				
0. Off task	7%	0%	0%	1%
1. Observing only	26%	40%	13%	14%
2. Overtly active part of time	50%	44%	54%	32%
3. Overtly active most of time	17%	17%	33%	54%
H. Intensity of subject's attention or arousal to task				
0. Off task	8%	0%	0%	1%
1. Low	24%	21%	14%	8%
2. Medium	52%	54%	33%	40%
3. High	17%	25%	53%	51%
INTELLECTUAL ENVIRONMENT				
I. Use of symbolically encoded data				
0. Not used in setting	7%	8%	18%	24%
1. In use in setting	93%	92%	82%	76%

	GEN.ED.	HEALTH ENVIRONMENT		
	Gen.Ed. Classes	Env.Sc. Classes	Project	Placement
J. Task novelty				
1. Familiar situation and information	5%	40%	7%	20%
2. Familiar situation, new information	88%	42%	67%	61%
3. New situation, familiar information	1%	10%	2%	1%
4. New situation and information	6%	8%	25%	18%
K. Staff data functions				
0. Staff not in setting	12%	6%	7%	27%
1. Data functions not manifest	10%	1%	12%	10%
2. Low data function level	18%	54%	6%	20%
3. Medium levels	41%	39%	53%	27%
4. High levels	19%	0%	22%	17%
L. Peer data functions				
0. Peers not in setting	1%	0%	0%	74%
1. Data functions not manifest	26%	4%	5%	10%
2. Low data function level	13%	68%	7%	10%
3. Medium levels	55%	26%	71%	4%
4. High levels	6%	1%	17%	1%
M. Subject data functions				
1. Data functions not manifest	27%	10%	8%	25%
2. Low data function level	26%	63%	12%	32%
3. Medium levels	44%	28%	66%	39%
4. High levels	3%	0%	14%	4%
PHYSICAL ENVIRONMENT				
N. Manipulative objects (other than reading and writing materials) used in setting				
0. Not used in setting	95%	100%	26%	21%
1. Used in setting	5%	0%	74%	79%

	GEN.ED.	HEALTH ENVIRONMENT		
	Gen.Ed. Classes	Env.Sc. Classes	Project	Placement
O. Staff, thing functions				
0. Staff not using things	96%	100%	49%	45%
1. Low	1%	0%	0%	12%
2. High	3%	0%	51%	43%
P. Peer things functions				
0. Peers not using things	97%	100%	30%	87%
1. Low	3%	0%	11%	13%
2. High	0%	0%	59%	0%
Q. Subject things functions				
0. Subject not using things	95%	100%	41%	26%
1. Low	5%	0%	33%	51%
2. High	0%	0%	26%	23%
VERBAL ENVIRONMENT				
R. Talk continuousness				
0. Silence	1%	1%	3%	16%
1. Sporadic talk	20%	10%	45%	52%
2. Continuous talk	79%	89%	52%	31%
S. Talk task relevance				
0. Silence	1%	1%	3%	16%
1. High	78%	96%	58%	76%
2. Partial	17%	3%	31%	4%
3. Unrelated	4%	0%	8%	3%
T. % of peer participation				
0. Setting silence	1%	1%	3%	16%
1. 0 - 10%	35%	26%	14%	65%
2. 11 - 50%	38%	57%	32%	7%
3. 51 - 100%	26%	15%	51%	12%

	GEN.ED.	HEALTH ENVIRONMENT		
	Gen.Ed. Classes	Env.Sc. Classes	Project	Placement
U. Goal of Talk*				
0. Silence	1%	1%	3%	16%
1. Assist manipulation of object	1%	0%	47%	40%
2. Explain, demonstrate	61%	89%	27%	40%
3. Theoretical	42%	36%	23%	23%
4. Future or past performance	28%	17%	22%	19%
5. Not related to task	14%	1%	12%	9%
6. Affect	6%	3%	10%	4%
V. Subject's rate of Soliciting				
0. None in 5 minute interval	50%	49%	17%	46%
1. 1 - 3	32%	29%	46%	37%
2. 4 - 6	10%	14%	18%	9%
3. 7+	8%	8%	19%	9%

* More than one goal of talk could be noted during a five minute interval, and thus the column percentages add to more than 100%.

SUBJECT'S RATE OF SOLICITING

NOVELTY OF SITUATION	None	1-3	4-6	7+	
Familiar	59 67.8 25.3	25 28.7 12.5	2 2.3 2.0	1 1.1 1.8	87 15.6
Mixed	152 40.1 65.3	128 33.8 64.0	48 12.7 72.8	51 13.4 89.4	379 68.2
New	22 24.4 9.4	47 52.2 23.5	16 17.8 24.2	5 5.6 8.8	90 16.2
	233 41.9	200 36.0	66 11.9	57 10.2	556 100.0

TABLE 3

Rate of subject's soliciting by novelty of the situation and information.

SUBJECT'S RATE OF SOLICITING

LEVEL OF SUBJECT'S THINGS FUNCTIONING	None	1-3	4-6	7+	
None	152 47.1 65.2	104 32.2 52.0	37 11.5 56.1	30 9.3 52.6	323 58.1
Low	61 38.9 26.2	65 41.4 32.5	17 10.8 25.8	14 8.9 24.6	157 28.2
High	20 26.3 8.6	31 40.8 15.5	12 15.8 18.2	13 17.1 22.8	76 13.7
	233 41.9	200 36.0	66 11.9	57 10.3	556 100.0

TABLE 4

Rate of subject's soliciting

by subject's things functioning.

SUBJECT'S SOLICITING RATE

RELATIONSHIP OF TALK TO TASK

	No Solicits	1-3 Solicits	4-6 Solicits	7+ Solicits	
Setting Silence	40 100.0 17.2	0 0.0 0.0	0 0.0 0.0	0 0.0 0.0	40 7.2
Highly Related Talk	164 38.5 70.4	171 40.1 85.5	54 12.7 81.8	37 8.7 64.9	426 76.6
Partially Related Talk	17 24.6 7.3	21 30.4 10.5	12 17.4 18.2	19 27.5 33.3	69 12.4
Unrelated Talk	12 57.1 5.2	8 38.1 4.0	0 0.0 0.0	1 4.8 1.8	21 3.8
	233 41.9	200 35.9	66 11.9	57 10.3	556 100.0

TABLE 5

Rate of subject's soliciting by relationship of talk to task.

SUBJECT'S RATE OF SOLICITING

SUBJECT'S READING LEVEL	None	1-3	4-6	7+	
Low	108 36.4 46.4	113 38.0 56.5	42 14.1 63.6	34 11.4 59.6	297 53.4
High	125 48.3 53.6	87 33.6 43.5	24 9.3 36.4	23 8.9 40.4	259 46.6
	233 41.9	200 36.0	66 11.9	57 10.3	556

TABLE 6

Subject's rate of soliciting by subject's reading level.

SUBJECT'S LEVEL OF THINGS FUNCTIONING

INITIATION OF SUBJECT'S ACTIVITY	None	Low	High	
Subject Alone	31 38.8 9.6	42 52.5 26.8	7 8.8 9.2	80 14.4
Subject With Peer(s)	23 46.0 7.1	8 16.0 5.1	19 38.0 25.0	50 9.0
Subject With Staff	97 53.6 30.0	42 23.2 26.8	42 23.2 55.3	181 32.6
Other Alone	172 70.2 53.3	65 26.5 41.4	8 3.3 10.5	245 44.1
	323 58.1	157 28.2	76 13.7	556 100.0

TABLE 7

Initiation of subject's activity by subject's level of things functioning.

SUBJECT'S LEVEL OF DATA FUNCTIONING

STAFF ACTIVITY LEVEL	Not Manifest Or Low	Medium Or High	
Absent	46 53.5 16.0	40 46.5 14.9	86 15.5
Low	23 60.5 8.0	15 39.5 5.6	38 6.8
Med	40 31.0 13.9	89 69.0 33.2	129 23.2
High	179 59.1 62.2	124 40.9 46.3	303 54.5
	288 51.8	268 48.2	556 100.0

TABLE 8

Subject's level of data functioning by staff activity level.

SUBJECT'S LEVEL OF DATA FUNCTIONING

SUBJECT'S LEVEL OF FUNCTIONING WITH PEOPLE	Not Manifest	Low	Medium	High	
Not Applicable	11 16.2 9.0	27 39.7 16.3	29 42.6 12.0	1 1.5 3.7	68 12.2
Low	58 31.2 47.5	72 38.7 43.4	54 29.0 22.4	2 1.1 7.4	186 33.5
Medium	38 20.0 31.1	42 22.1 25.3	99 52.1 41.1	11 5.8 40.7	190 34.2
High	15 13.4 12.3	25 22.3 15.1	59 52.7 24.5	13 11.6 48.1	112 20.1
	122 22.0	166 30.	241 43.	27 5	556 100

TABLE 9

Subject's level of data functioning by subject's level of functioning with people.

SUMMARY OF SOCIAL ENVIRONMENT

Overall the data showed that the subjects were not passive onlookers in projects and placements, but tended to be actively engaged in tasks in these settings, more independently in the placements than in the projects. Environmental Science resembled the General Education classes in being conducted modally in large group discussions, but with at least a moderate participation rate. Staff in projects and placements functioned at lower levels of power than staff in classes, in relation to subjects. Conversely, subjects in projects and placements functioned with people -- staff, patients, and peers -- at somewhat higher levels of power and complexity than they did in classes. Subjects participated more in the initiation of ongoing activity in projects and placements than in classes. It can be concluded that the projects and placements did have more of the co-operation that is attributed to non-formal educational settings. It could also be said that the social environments of the different settings of the program complemented each other, and that between them the students experienced and participated in a range of roles.

SUMMARY OF DATA FUNCTIONING OBSERVATIONS

In general, the subjects' levels of data functioning appear to have been higher than the level that has most frequently been attributed to students in conventional classrooms when Bloom's Taxonomy has been used to analyze levels of cognitive functioning, sheer knowledge retrieval or recall. The one exception to this is the Environmental Science classes, where, once again, the observations disproportionately represented test related activity, and underrepresented higher level data functioning that was often observed in informal visits to these classrooms. That the subjects' data functioning was so nearly comparable in the General Education classrooms and in placements is intriguing. Most of this functioning in

placements took place in concrete tasks rather than in didactic discussion, and nearly half of these tasks were unsupervised. What difference the supervision made will be taken up later. The exceptionally high levels of subjects' and staff's data functioning in projects points to the possible effects of combining didactic and experiential aspects of activity. The high level of data functioning in the SETH settings overall, excepting the test sessions in Environmental Science classes, might be evidence that the formal and non-formal aspects of the program did reinforce one another as the program model projected. This cannot really be known without other settings for comparison. In any case, the substantial overlap between subjects' and staff's data functioning in both projects and placements implies that the subjects, and thus the students of whom they were a sample, were indeed exhibiting entry level cognitive skills for health environment careers. In the most literal sense, they entered into the data work of the project and placement tasks.

MANIPULATIVES IN THE ENVIRONMENT

Manipulative things other than writing materials -- simple objects like test tubes and bed sheets, and complex tools or machines like a microscope or video camera and recorder -- were rarely observed in use in the General Education classes, never were observed in the Environmental Science classes, but were observed being used three quarters of the time in both the projects and the placements.

When staff used objects, the level of their functioning with (these) things tended to be relatively high. This means that they were more often observed manipulating, operating -- controlling, and so on through setting up, the highest level of the D.O.T. job things functions analysis scheme, and less often just handling or tending things. Manipulating or operating video equipment, a microscope, a centrifuge, and tooth extracting equipment, were examples of this higher level things functioning. Student peers were infrequently present in placements, but in projects the modal level of things functioning that was observed for peers was also manipulating or higher, on those occasions when objects were in use.

Subjects themselves worked with things slightly more than half the time in projects, and three quarters of the time in placements, in both cases at low levels of things functioning more frequently than at high levels. While subjects did operate video and laboratory equipment approximately a quarter of the time both in projects and in placements, they were more often observed in actions like holding a mirror or a suctioning tube for a dentist, placing x-ray plates in a developing cabinet and later removing and posting the plates, holding a microphone during an interview, and so forth. As these examples illustrate, however, even the lower level things functioning tended to be central to the action in the subjects' setting.

The projects and placements clearly represented more of a "hands on" experience for the SETH students. That

physical objects were involved in project and placement activity most of the time is in line with the characterization of these as non-formal settings, and raises questions about the interaction between things presence and other features of the settings, for example the uses of language and the levels of data functioning in these settings.

DISTRIBUTION OF SOLICIT AND RESPONSE RATES ACROSS THE FOUR PROGRAM COMPONENTS

Soliciting is the major focus of the project's research on SETH students' verbal output. The working assumption has been that the more soliciting a student does, the more control that student gains over the content and structure of his learning setting. Increased control is viewed as commensurate with a greater potential that the student will learn from the setting.

Studies of student verbal performance in traditional classrooms have revealed a preponderance of student responding over student soliciting. Studies of minority students' verbal output in schools have indicated that these students, because of different language competencies, very often require other than traditional educational settings to become verbally engaged with curriculum materials at all. This section of the report presents the quantity of soliciting and responding, SETH students performed program-wide and how those quantities were distributed over the program's four components.

It is noted that 'rate' of soliciting is a measure of the number of solicits made by the subject per five minute observation segment and says nothing about the quality, addressee or topic of the soliciting.

Program-wide: On program-wide basis, there is more time spent in soliciting than in not soliciting; 58% vs. 42%. However, the segments with a lower rate of soliciting (1-3) exceed those with a moderate rate (4-6) which in turn exceed those with a high rate (7+). The percentages are respectively, 37%, 12% and 10%. Thus the modal rate for SETH students is between one and three solicits every five minutes.

The picture for responding is important in that it shows less responding than soliciting -- there are more segments with no responses than there are with no solicits and fewer of the segments have moderate or high rates of responses than have moderate or high rates of solicits.

Intra-program differences: The environmental science setting of the four components of the program are most conducive to soliciting. Table shows that the environmental science settings contain the lowest proportion of segments with no soliciting and the highest proportion of segments with higher rates of soliciting. Both the environmental science project component and the environmental science classes have higher rates of soliciting at the 4-6 rate than the general education classes. It seems that the environmental science curriculum taught in both the traditional recitation format and in the more experiential format of the projects are activating relatively high rates of soliciting.

What properties of the SETH settings were associated with subjects' greater involvement, higher levels of people, data and things functioning, and more frequent soliciting? Answer to this question would clearly be useful for the design and modification of environmental education programs. They would further understanding of experiential education more generally.

It must be stated again that the data does not readily lend itself to tests of significance. At the same time, it has been examined cautiously. Relationships, for example between subjects' data functioning and the level of activity of staff, will be presented here as stronger when they have been found to be associated in a given direction across classes, projects, and placements alike. Where a relationship is not as clearcut as this, but a meaningful pattern can still be discerned, it will be presented as such.

GENERAL SUMMARY OF ANALYSIS OF CONDITIONS ASSOCIATED WITH HIGHER LEVEL PERFORMANCES

The simplest, most general conclusion is that subjects functioned at their highest levels when staff alternated between didactic and enactive roles, in supervising, or engaging students co-operatively in, operational tasks. These optimal staff roles were open to subjects' soliciting, and were adapted to students' competencies and knowledge. This was reflected in the overlap between staff and student people, data, and things functioning, in the medium intensity of staff activity and the joint initiation that characterized the highest levels of both soliciting and functioning, and in the association of students' soliciting with "partially related talk," i.e., talk that was an accommodation between the main goal of an activity and students' information and interests.

The obverse of this is that students too played a part in producing higher levels of functioning, by their making the accommodations that resulted in partially related talk, and by their verbal soliciting, especially in the placements where staff might have been less likely, at least in their official roles, to exploit the learning opportunities for the students.

Things were indeed present more in projects and placements than in classrooms, but their presence did not have

consistent relationships with subjects' soliciting or data functioning. Students' familiarity with these things or with the results they produced varied between projects and placements, with variations in soliciting and data functioning accordingly. Things did enter into a larger pattern: the importance of operatives -- people, data, or things that could be functioned with to yield meaningful results, or results with feedback -- in sustaining students' activity during time intervals when staff were not present to supervise or respond to students. The combination of medium intensity staff activity and the presence of operatives occurred most often in projects, and suggests an interpretation for the particularly high levels of student performance observed in projects, the intersect between formal and informal education that was diagramed in the first section of this report. It must be stressed, however, that this optimal combination was observed at times in the classes as well, and most of the time that staff were present in the placements.

Not only were physical objects used almost as much in projects as in placements, but talk continuousness in projects was intermediate between classes and placements. This conforms further to the expectation that projects would combine the properties of formal and non-formal settings. A question is raised, however, by the fact that the goal of talk was categorized as "theoretical" for the

same proportion of time, 23%, in the projects and placements, while it was theoretical 40% of the time in classes. Should not projects have been intermediate between classes and placements in this important respect, i.e., would not teachers (the project staff) have capitalized on the theoretical implications of the tasks more often than hospital staff?

Of course, since talk continuousness was considerably higher in projects than in placements, the actual amount of theoretical talk was proportionally higher. Another side to the question, however, is that theoretical talk may have occurred more often in the students' placements than the concept of non-formal had led these investigators to expect. Perhaps especially because Mount Sinai is a teaching hospital, there were frequently theoretical discussions among staff in the presence of students, for example when a supervising dental surgeon discussed with a dentist in training an operation in which a SETH subject was assisting. Further, on several occasions the observers noticed hospital staff stepping up the teaching role after the first 10 minutes or so of an observation, or during a lull in the activities of the placement. This suggested an unintended effect of the observation procedure, the communication to hospital staff that they were now accountable for both their medical practice and the students' education. This was, however, a

matter of degree rather than of kind. There were various evidences that most of the placements had been carefully selected and managed to be optimally productive for students. Again, the students' own questioning, together with staff's openness to it, contributed to the placements' educational value. Finally, a few placements actually created tasks for the students, for example, learning to recognize different bacteria with an electronic microscope, rather than relegate the students to assignments that were too passive, repetitive, or undemanding.

The major issue in placement -- indeed, seems to be the potential conflict between accountability to the students and accountability to the unit's standards. In the clear majority of cases observed at Mount Sinai, a good accommodation appeared to have been reached. There were some cases, however, where the match seemed less than satisfactory. In x-ray, for example, a subject spent most of the time during the observation following the technician around, watching the technician's positioning the patients and operating the machine, later listening to staff discussions of x-rays as they were posted, but only being asked, or allowed, to insert the plates in a developing cabinet and later remove them for posting (technicians inside the cabinet did the actual developing). It seemed to the observers that either the assignment should be designed to incorporate the subject more in the unit's activities, or, if this could not be done

without compromising the standards of the unit, then a different placement should be found. The subject, however, reported that he learned much just from observing in this placement, and in fact was influenced by it to choose an x-ray technician's career. Would it have been still more valuable if, like most of the placements, and like the projects, the x-ray placement had been more of a hands-on experience? The question is unanswerable without a more extensive, especially a longitudianal, study. All of the basic indices in the present study, however -- involvement, levels of people, data and things functioning, and soliciting -- point to the value of combining the didactic and the active experiential components of the learning environment. At the least, it can be asserted that the projects, and in most cases the placements, promoted the behaviors that the SETH Environmental Health Program stipulated would evidence students' involvement in situations where health problems were being dealt with, and their developing entry level skills for medical and environmental health careers. A larger possibility, which further research will have to pursue, is that SETH enhanced the general quality of its students education, especially their learning about learning, through the interplay of its formal and non-formal settings.

INTERVIEWS WITH STUDENTS

The evaluation unit postulated that a student's perception of his environment would have a bearing on the subject's behavior and learning in each setting of the environment. It was decided that the most flexible and valid means of obtaining information about student perception of the environment would be to conduct a structured interview with each student. Therefore, an interview protocol was developed in which the major focus was to investigate how subjects perceived learning to be facilitated in the general education and environmental health classes, the projects and the placements and how students viewed their own behavior in each setting. The interview protocol was based on some of the primary variables in the SBI and VBI; specifically subject perception of his own data, thing and people functions and his own initiating and soliciting behavior in each setting. Subjects were also asked to evaluate the SETH Program's experiential approach to education and to discuss the influence of the program on their formation of career goals. Furthermore, the interview focused on student perception of the entry level skills they would need and SETH's role in helping students acquire entry level skills. The tape-recorded interviews averaged approximately 30 minutes in length and were conducted by members of the evaluation unit at the end of the evaluation period.

Interviews with subjects provided the evaluation unit with student evaluations of their learning environments and with a context in which to interpret observation data. The self-report data provided by the structured interview enriched and often substantiated the observation data.

The evaluation unit found that students were interested in discussing their learning environments and appeared to enjoy the opportunity to consider educational issues which they had not previously considered. One conclusion which can be drawn from the interviews is that educational programs should provide students with more opportunities to discuss their own educational experiences and their perceptions of the educational process.

Another discovery made from the interviews was that students apply different criteria in evaluating classroom settings than they do in evaluating work settings. In the work setting subjects favored an experiential, activity-oriented, non-formal approach to learning. In the classroom subjects preferred a more traditional, teacher-directed, formal approach. The evaluation unit would suggest that in opening a dialogue with students about the educational process, particular attention be drawn to the relationship between formal and non-formal education and the value of each. Through such a dialogue students might become more tolerant of non-traditional approaches, might view their educations in a larger context, and would hopefully become more active participants in their own education.

THE OBSERVATION INSTRUMENT

The Setting Behavior Inventory (SBI) and Verbal Behavior Observation Instrument (VBOI) have produced descriptive data that appear to differentiate the more formal and nonformal aspects of the SETH program, and to suggest important interrelationships among the setting variables and students' performance. The SBI and VBOI can be modified and condensed. Changes in the specific categories of observation are recommended in the Final Report. What follows is a brief commentary on the observation procedure.

The evaluation unit has concluded that it must turn to a more conventional event sampling technique, rather than following individual students for lengths of time that result in interdependent observations. The investigators' unfamiliarity with the hospital placements particularly led to the perception of a need in the year past to follow an individual subject through the entire course of a morning in a placement, anticipating that activity might be very different between different phases of the morning. In the main, this turned out not to be the case. If there was a slowdown of activity in some placement settings toward the end of the morning, this would be represented just as well in randomly distributed samples of briefer time spans as in the longer observations. What was not observed was a developmental sequence of time phases that might be violated by briefer observations. Routines tended to recur throughout the

duration of a project or placement session, the major exception being when a project group moved from one location to another, say from inside to outside.

Of course, the more experiential settings especially can show continual change in their properties at certain levels of description, as, for example, individuals enter and leave a setting. The proposed strategy reflects some progress with, but not a complete solution of, this problem.

It is recommended that the next observations focus on a given subject for a 15 minute interval, then shift to another subject in another setting for 15 minutes, then to a third for 15 minutes, and so on. Between eight and twelve observations would be collected by a single observer over the course of a day, presuming that the different settings to be observed in were, as at Mount Sinai, in close enough proximity to allow this shifting. The data collected during a given 15 minute interval would be treated as a single observation, i.e., behavior counts would be summarized, judgments as to highest level of functioning would be made just once, etc.

During the first five minutes of an observation the observer would note the relatively fixed features of the setting: data, time, concern, location, things and data sources in use, people in the setting, and interaction format. During the middle five minutes, verbal interaction among the participants would be recorded, and characterized. The last five minutes would be used

to make summary judgments about the highest levels of things, data, and people functioning observed from the beginning of the observation, together with judgments about the activity levels of the different participants in relation to the subject and how the initiation of activity was shared.

If the observer's initial perceptions of the relatively fixed features were modified after the first five minutes, for example a staff member entered and the interaction format was subsequently perceived to be a supervised task instead of an unsupervised task, changes in the record could be made accordingly. The summary judgments at the end would take this into account, for example in recording staff's being active in relation to the subject for less than the full time. If, however, a whole constellation of setting properties changed, for example in a recitation ending and seatwork beginning, the observation to that point would be scratched and a fresh observation of the same subject would commence. Just where to draw the line for these decisions between changes within a setting and changes of a setting will have to be worked out in the first trials of the revised procedure. The 15 minute observation interval considerably reduces the likelihood of this, compared with the longer intervals used this year.

Some variables from the instruments would be retained in their present form, some would be revised, and some would be eliminated.

The proposed changes represent an agenda for the initial work of a team that carries on the work of the present evaluation unit. The instrument that would emerge from this has considerable promise for the study of contrasting educational settings, formal and nonformal, academic and experiential, or school and work, as these might variously be identified.

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